The Southern Plains Cyclone

A Weather Newsletter from your Norman Forecast Office for the Residents of western and central Oklahoma and western north Texas

We Make the Difference When it Matters Most!

Volume 5 Winter 2007 Issue 1

Meet Your Weatherman Matt Foster

Greetings! My name is Matt Foster, and I am the Information Technology Officer (ITO) for the Norman Weather Service Forecast Office. As the ITO, I am responsible for many aspects of the computer operations in our office. This includes installing, configuring and maintaining many of the software packages that we use operationally on a daily basis in the Forecast Office. I also design and write specialized software to fulfill "niche" needs that can not be obtained easily from any commercial or National Weather Service software. I also sometimes assist our Electronic Systems Analyst, Jeff Engel, in maintaining the security of our networks and configuring new hardware. I am not, however, just the office's resident "computer geek," but I am also a meteorologist!

Like most of the meteorologists around here, my interest in weather developed at quite a young age, and growing up in southeast Kansas (Pittsburg) I got to see a lot of interesting weather. My mother has often said that I was the only toddler

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Oklahoma's Centennial 100 years of Oklahoma History

By Chris Sohl, Lead Forecaster

In recognition of Oklahoma's Centennial celebration, the National Weather Service Forecast Office in Norman is providing historical information on weather events that have occurred during the past one hundred years. Twice daily, the Forecast Office will issue Public Information Statements containing snapshots of Oklahoma's weather history. This information is available to the media, on the internet, and is also broadcast on NOAA Weather Radio.

One of the Public Information Statements will describe a notable weather event that occurred in the state on that day during 1907, the year of statehood. A second Public Information Statement will describe weather events that have occurred on that day anytime during the past 100 years.

Oklahoma's weather still exhibits the same wide range of variability as it did 100 years ago whether it's manifested in droughts, floods, heat waves, winter storms,

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An Introduction to the Enhanced Fujita Scale

By Doug Speheger, General Forecaster

Most people in Oklahoma are familiar with the Fujita scale for rating the intensity of the damage caused by tornadoes. But this year, the Fujita scale is being modified, and the National Weather Service will begin using this modified scale called the "Enhanced Fujita Scale."

Dr. Fujita from the University of Chicago created the Fujita scale (or F-scale) in the 1970's, and it rates tornadoes on a scale from F0 which produces very minor damage, to an F5 tornado which creates incredible damage. Examples of F5 tornadoes include the 1965 Wichita Falls tornado, and the May 3, 1999 Bridge Creek-Moore-Oklahoma City tornado. The scale had both estimated degree of damage for different classifications of tornadoes to frame houses, and also a wind speed scale. Of course, very few tornadoes have actually had wind speed measurements taken, so the Fujita scale in practice has been a damage scale, where the rating of the tornado is estimated based on the damage that the tornado causes.

The F-scale has been a useful way to classify the estimated tornado intensity based on the damage. But it has also had some problems. One issue is that the primary type of structure that is used to investigate

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Tales, Legends, and Other Sayings

By Mike Branick, Lead Forecaster

Weather-related sayings and stories have been commonplace in many cultures since the beginning of time, many of which have been passed down through the years. Are they truth, or are they myth? Can they really be used to predict the weather? This column will examine a different popular weather saying in each issue, exploring its origins and whether or not there is any real meteorological truth upon which it might be based.

If you have heard of a particular weather-related story or saying that you've always wondered about and would like us to look into it, please e-mail your questions and requests to *Jennifer.Palucki@noaa.gov*.

This Issue's Topic – "Raindrops are shaped like teardrops."

Nope, they're not. This is a myth that has been perpetuated in popular culture over the years by numerous artistic sources, including illustrators of books, news/magazine articles, and - unfortunately - too many TV meteorologists. The typical, but erroneous, artists' rendering of raindrops is a series of circles or spheres with pointed extensions or protrusions on the top - i.e., teardrops.

But in the real world, raindrops aren't shaped like that at all. The shape of a raindrop is determined by two main forces: the surface tension of the water, which tends to hold it in a spherical shape, and upward pressure exerted by the air that the drop is falling through. In small raindrops (a millimeter or less in diameter), surface tension dominates and the drops are round, or spherical. No protrusions, no irregularities. Larger drops, up to several millimeters in diameter, become flattened at the bottom (similar to a hamburger bun), due to the increasing effect of air pressure from below as the drop falls faster.

What happens to a raindrop that grows to more than about 4 millimeters in diameter is a case of truth being stranger than fiction. As the drop grows and upward air pressure increases, flattening of the bottom creates an inward depression in the bottom of the drop. This cavity then expands rapidly once the drop reaches about 4.5 millimeters, turning the drop into what looks like a parachute or a bubble that's open on the bottom, with a ring of water around the base. At this brief moment, the "drop" may resemble a sort of jellyfish (but without the tentacles). The "parachute" then bursts into a series of smaller drops, which due to surface tension return quickly to spherical shapes.

So a raindrop evolves from a sphere, to a hamburger bun, to a jellyfish, and back to a series of spheres. But at no time is it shaped like a teardrop.

Reference: "Bad Rain" - *http://www.ems.psu.edu/~fraser/Bad/BadRain.html*

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she'd ever seen who not only was not afraid of thunderstorms, but actually had their face pressed to the window to watch the lightning. I attended college first at Pittsburg State University and then the University of Kansas, from which I graduated with a Bachelor of Science degree in Atmospheric Sciences in 1991.

My government service began as a Meteorologist Intern at the NWS Meteorological Observatory (WSMO) at Longview, TX in 1992. From there, I went to the Weather Service Office in Daytona Beach, FL, and I then obtained a Journeyman Forecaster position at the Weather Service Forecast Office in Shreveport, and then moved into the newly-formed ITO position there in 2002. In the fall of 2004, I learned that the ITO here in Norman had accepted a position in Georgia, and I jumped at the opportunity to (1) work at one of the premier Forecast Offices in the NWS, and (2) move a bit closer to both my wife's and my families who are all in the southeast Kansas/southwest Missouri area. My wife, Jenny, and I have one daughter, Claire, who was born in January of 2005.

While my forte' is definitely in the computer area, I still remember enough meteorology to help out in the operations area at times, especially during active events. I have also been a licensed ham radio operator for 24 years (call sign N0EYE), so during storm season our SKYWARN spotters may hear me on the radio during active weather events reading outlooks, statements, watches and warnings.

I am truly honored and privileged to work at such a fantastic facility at the new National Weather Center, and there is no better group of people to work with than those in our Forecast Office. The level of caring and dedication among every single staff member routinely inspires me to push the limits of my abilities to bring the taxpayers of our County Warning and Forecast Area the highest level of service possible!

The Radiosonde Replacement System is here!

By

Jennifer Palucki, Meteorologist Intern

Diagnosing weather conditions above the surface of the earth is necessary for research and forecasting. As early as the 18th and 19th centuries, kites and manned hot air balloons were used to retrieve temperature, pressure and relative humidity measurements aloft. Though these systems provided much needed data, they were sparse, it often took several days or weeks to analyze, was only available during good weather days, and lacked wind measurements. By the end of the 1800's into the early 1900's, unmanned balloons began to carry meteorological instruments into the atmosphere, but data were not able to be analyzed until the instrument fell back to the surface and was found. It wasn't until the late 1920's that real-time measurements were available. Meteorological instruments known as radiosondes radio-transmitted the temperature, pressure and relative humidity data back to the office. Though these measurements were received in real-time, it often took a significant amount of time to analyze and process the data since computer processing systems were not yet developed.

In 1937, the US Weather Bureau (now the National Weather Service) established a network of radiosonde stations which still exists today. But the need for accurate and timely measurements increased during the World War II era. During this time, the radiosonde network grew, and advancements in radio-direction finding or radio-theodolite technology, allowed the radiosonde to be tracked in flight so that wind measurements could be obtained. However, the analysis of all the data often took two to three people and several hours to complete. Advances in computer system technology in the 1980's greatly reduced the workload. Through the use of a personal computer, the National Weather Service was now able to acquire, process and disseminate upper air data in real-time and in all weather situations. Upper air data is known as the combination of temperature, pressure, relative humidity, wind speed and wind direction data.

Up until this November, your National Weather Service Forecast Office in Norman had been using this 50+ year old tracking equipment and the 20+ year old computer to gather, quality control and disseminate upper air data - BUT NO MORE! The Radiosonde Replacement System has arrived! This new system has all of the capabilities of the old system, but with many additions and improvements. The tracking system and radiosonde has been updated with the latest global positioning system or GPS technology. This means during the balloon flight, we can see exactly where it is or how far it has traveled. Wind speed and direction measurements are far superior owing to no dropouts. With the old system, if the tracking antenna's line of sight to the radiosonde was obstructed by a building, tree or other obstacle, winds tended to be erratic and deleted. In addition to better wind data, there is just more data in general. All of the upper air data is transmitted back every second, as opposed to every six seconds with the old system. In addition to better quality and quantity of data, the computer interface is much more user-friendly.

We are pleased with how the new system is performing, and look forward to its use in the future.

Left: Tracking Antenna as seen from inside the dome.

Did you know...

- *It takes approximately 90-100 minutes for the balloon to burst.*
- *On average, the balloon ascends 30,000 meters, or nearly 100,000 feet, or almost 20 miles!*
- *Since the balloon expands as it rises, you can actually see it pop! At that time, the balloon is about the size of your bedroom!*

Above: Example of the new GPS Radiosonde with sensors marked. Note that the pressure sensor is not visible.

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tornado damage and assign an F-scale rating is a "well-built frame house." But there are a number of tornadoes that do not hit a frame house. For these tornadoes, the F-scale assigned is probably lower that the tornado's actual intensity, because it is difficult to assign a proper rating when there were no houses damaged. Also, when the most significant damage occurs to buildings that are not frame houses (such as the Outlet Mall in Stroud, OK damaged by the May 3, 1999 tornado, or the General Motors plant in Oklahoma City on May 8, 2003), the F-scale is not equipped to assign an accurate F-scale rating to these structures.

Another problem is that the wind speeds assigned to each F-scale rating were never scientifically compared to the degree of damage that Dr. Fujita assigned to each rating. For example, the minimum wind speed assigned to an F5 rating is 261 mph, but many structural engineers have argued that the damage associated with an F5 tornado (a frame house being destroyed and the debris swept away) can be caused by much lower wind speeds than 261 mph.

To address these issues, beginning in 2001, meteorology damage assessment experts and structural engineers began the process of developing an "Enhanced Fujita Scale" (or EF-scale). The main goals were to identify items that can be damaged (not only frame houses, but also commercial structures, mobile homes, barns, etc.), correlate the appearance of various degrees of damage to these structures to estimate wind speeds, and to preserve the historic tornado database for some degree of consistency between the F-scale and the EF-scale. In 2004, this EF-scale was introduced to the meteorology and engineering communities.

The results of this process are impressive. Instead of damage to frame houses being almost the sole basis of F-scale as before, there are now 28 different structures (many types of buildings, electrical poles, and trees) that can be used to estimate the strength of the tornado. For each of these 28 types of structures, a table has been created to estimate a wind speed range that would have been capable of producing various degrees of damage to that structure ranging from minor superficial damage to complete destruction. But the degree of damage that is visible can be a result of not only the tornado winds, but also how well-built the structure was. So for each degree of damage, there is a range of expected wind speeds. For example, if a large section of the roof of a frame house is removed, but most of the walls remain standing, the expected wind speed associated with this damage is about 122 mph, but can range from 104 mph to 142 mph depending on how well the roof has been attached to the walls of the house. So a damage surveyor will use not only the degree of damage to estimate the winds, but will also investigate how well-built the structure is.

Once the most significant points of damage of the tornado path have been surveyed, then the wind speed assigned to these points will be converted to an EF-scale rating between EF-0 and EF-5. The wind speeds assigned to F-scale and EF-scale ratings are listed below.

One of the first things you will notice is that the wind speeds associated with the EF-scale rating categories are much lower that F-scale categories, but the new speeds are believed to be better estimates of the wind speeds necessary to cause the damage associated with each rating category.

Over the last 20 years, researchers have used portable research radars to measure the wind speeds of tornadoes, but these wind speeds are not directly comparable with the wind speeds of the rating scales. First, the radar measurements are "instantaneous" wind speeds, or the speeds that the radar detects the instant that the radar beam hits a target. These wind speeds will be lower if averaged over 3 seconds, which is the duration used for EF-scale winds. Second, the radar beam is almost always measuring the wind at a height at least a few hundred feet above the ground, which does not necessarily represent the wind speed within a few feet above the ground where the damage is occurring. So while the wind speeds measured by radar have been somewhat comparable to the wind speeds assigned by the F-scale rating in a broad sense, these wind speeds have both likely overestimated the wind speeds that were occurring closer to the ground and average over a few seconds. These radar-derived wind speeds are likely to be higher that the wind speeds of the EF-scale rating determined by damage nearly all of the time.

The National Weather Service will implement this new scale on February 1, 2007 and tornadoes that occur on or after this date will be officially rated with this EF-scale.

F-Scale Rating	Fastest 1/4 Mile Wind Speed (mph)	EF-Scale Rating	3-Second Gust Wind Speed (mph)
F0	40-72	EF0	65-85
F1	73-112	EF1	86-110
F2	113-157	EF2	111-135
F3	158-207	EF3	136-165
F4	208-260	EF4	166-200
F5	261-318	EF5	>200

Right: Wind speed comparison between F-scale and EF-scale ratings. Note: The Fastest 1/4 Mile wind speed refers to the wind averaged over the time it would take to go 1/4 mile. This would range from 3 seconds for a wind of 300 mph to 9 seconds for a wind of 100 mph.

Inside Operations: The Winter Storm of November 30, 2006

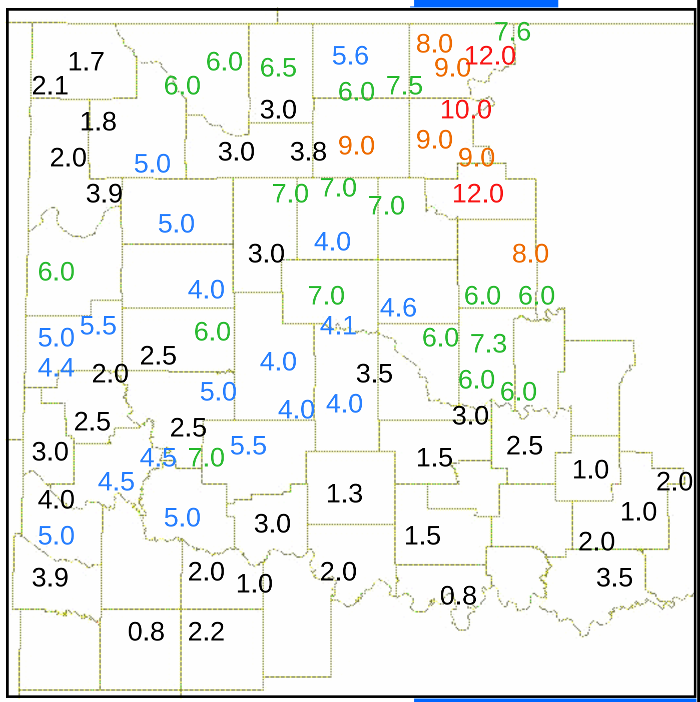
By

Patrick Burke, General Forecaster and Kevin Brown, Lead Forecaster

Through much of November, Oklahoma and western north Texas enjoyed sunny and unusually warm weather, with highs in the 70s and even a few 80s. Meanwhile, half a continent away, events were under way that would bring a major *winter* storm to the Southern Plains. An arctic air mass expanded from Alaska into western Canada beginning November 15th. The jet stream then amplified, creating more north to south steering flow, which was favorable for bringing the frigid cold into the central United States.

Forecasters at the National Weather Service Forecast Office in Norman were confident that a dramatic change was on its way, and that it would likely bring wintry precipitation, but how much precipitation remained uncertain even within a few days of the November 30th storm. The difficult forecast was tied to an upper level storm that would develop over the region at nearly the same time that the cold air at low levels was due to arrive. The strength and speed of the storm would make a big difference in the amount of ice and snow to expect. Late Tuesday night, November 28th, forecasters who were still working with a broad set of possible solutions issued a Winter Weather Advisory. The Advisory was issued more than 24 hours prior to the expected event, and was intended to provide sufficient lead time for the public and emergency managers to prepare.

On Wednesday, November 29th, with both the lower and upper level weather features firmly inside the dense network of U.S. weather observations, the storm potential rapidly came into focus. Freezing temperatures rushed into western and central Oklahoma by mid morning, narrowly separated from developing rain and thunderstorms. Satellite and weather balloon data showed the upper level storm strengthening and slowing down, and numerical weather forecast models came to the unanimous conclusion that a major winter storm was imminent. Everyone at the Norman Forecast Office pitched in that day. Technicians ensured the quality of radar and local data sets, while forecasters and managers tag-teamed both the short and long term forecast desks, conducted a conference call with state and local emergency management officials, and provided a live-event update for the public via weather radio. By early afternoon, the entire forecast area, including western north Texas, was under a Winter Storm Warning for heavy ice and snow.



Above: Total sleet and snowfall accumulations during the Winter Storm of November 30th. Reports are courtesy of our cooperative observers.

The storm lasted from Wednesday evening to Friday morning, peaking on Thursday, November 30th. Throughout the event all manner of winter weather was reported across the region, ranging from thunderstorms with heavy freezing rain and sleet, to heavy snow and blowing snow. For the first time in about two decades, forecasters upgraded a portion of the Winter Storm Warning to a Blizzard Warning. North Central Oklahoma experienced these particularly life threatening conditions, as 35 to 45 mph winds created whiteout conditions north of the Oklahoma City metropolitan area up to the Kansas border.

The wind made measuring accumulations very difficult, as snow was swept away from open areas and piled up near obstacles. Many areas reported snow drifts over two feet tall. The best way to measure snow in such conditions is to take an average of 10 snow measurements from a mix of high and low spots. When the storm had settled, the National Weather Service cooperative observing network revealed a swath of generally 5 to 9 inch snowfall from Elk City to Okeene, Enid, and Ponca City.

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tornadoes, or dust storms. However, what has changed since statehood are the tools available to observe and forecast the weather.

In 2007, a rich dataset of surface weather observations are available from across the state of Oklahoma. The Oklahoma Mesonet automatically collects and transmits weather condition every five minutes from over 115 sites. Automatic weather observing systems at several airports around Oklahoma sample surface weather conditions every 60 seconds. Both of these systems typically operate around the clock, usually with little or no human intervention. Along with the automated observing systems, over 200 cooperative observers provide valuable rainfall and temperature data at least once a day.

Above: Wreckage after a tornado hit Tinker Air Force Base on March 25, 1948. This storm prompted the first recorded tornado forecast. *Photo credit: Tinker Air Force Base History Office.*

While the density of surface observation sites was not as rich in 1907, there were still over 60 locations where rainfall (and sometimes maximum and minimum temperature) data were recorded. Some locations are still active 100 years later including Mangum (since 1892), Guthrie (1889 - the original capital of Oklahoma), Norman (1894 - who's first observer was University of Oklahoma Professor DeBarr), Okeene (1903 - of rattlesnake hunt fame), Fort Sill (1870), the Wichita Mountains Wildlife Refuge (1906), Durant (1901 - Indian Territory) and Stillwater (1893).

Nearly 20 locations that took weather readings in 1907 are no longer active. Fort Gibson (since 1824 - Muskogee County and Indian Territory) is notable in that the site shares the honor with Fort Townson (Choctaw County and Indian Territory) as having the earliest routine weather records in Oklahoma (however, Fort Townson was no longer an active site by 1907). Back in its early years, Fort Gibson was believed to be the farthest west observing station in the United States. Other now inactive sites (and the date of their earliest observations) include Cloud Chief (1893 - Washita County), Sac and Fox Agency (1892 - Lincoln County), Grand (1903 - Ellis County) and White Eagle (1903 - Kay County).

Above: A 4-inch hailstone measured in Ada, OK on April 29, 1978. *Photo credit: NOAA Photo Library.*

In 1907, there was no instrumentation in Oklahoma that could directly observe weather elements at a distance from a station (except perhaps for the occasional telegraph line that would be suddenly knocked out by a storm). One hundred years later, modern-day weather radars scan the horizon for developing storms allowing forecasters to provide early warning of violent storms while satellites provide a view of the weather over Oklahoma from space. At the time of statehood, frequently the only warning of an approaching violent storm was when it came in view as it roared over the horizon or, worse, when debris filled the air as one's home was being destroyed.

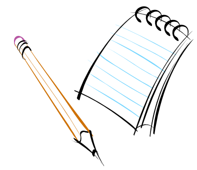
In 1907, weather balloons had yet to be developed that could measure the upper levels of the atmosphere in real-time. Research papers of the era indicated that meteorologists in 1907 were furthering their understanding of the physical equations governing the behavior of the atmosphere, but the application of this knowledge beyond a basic sense would have to wait until the second half of the century and the advent of computers. Instead, 1907 forecasts were prepared manually and distributed out of the nearest District Forecast Office, which for Oklahoma, was in New Orleans. Incidentally, the District Forecaster in charge of the New Orleans office in 1907 was Isaac M. Cline, who was also the Chief Forecaster at Galveston, Texas when that city was devastated by the great hurricane of 1900.

Above: Aftermath of the Union City tornado of May 24, 1973. *Photo credit: NOAA Photo Library.*

The past one hundred years have witnessed an exponential growth in weather observing and forecasting systems. Timely warnings and other weather information are now disseminated within seconds rather than in days. From a modest beginning in 1907, the Oklahoma landscape has not only provided a fertile breeding ground for active, and sometimes violent, weather, but is now also home to advanced weather observing systems, world-class weather research and forecasting, and the development of weather technologies for future generations.

A small sample of Oklahoma's weather history is shown in the photos above.

Norman Office Forecast Notebook - A Complete Look at Events and Happenings



By Rick Smith, Warning Coordination Meteorologist

Helping Keep Schools Safer. Public schools across Oklahoma and north Texas are receiving a tool that will help keep students and staff safer and more informed about emergencies. NOAA Weather Radios (also known as Public Alert Radios) are being distributed to over 97,000 public schools in the United States. Radio distribution began in September of 2006, with a goal of having at least one weather radio in each public school. The school distribution program is sponsored by the Department of Homeland Security/ Citizen Corps, the Department of Commerce/National Oceanic and Atmospheric Administration (NOAA) and the Department of Education/ Office of Safe and Drug-Free Schools.

Since many schools in Oklahoma and Texas already have weather radios, it is hoped the new radios can be used to replace older radios, or to allow the older radios to be used in gymnasiums, auditoriums, or other school buildings.

NOAA Weather Radio is a powerful safety tool, with dozens of alerts and a broadcast capability that ensures direct access to information on a wide range of emergencies. Whether it's a telephone outage disrupting 911 services, an approaching tornado, local roads overrun by flash floods, a derailed train posing a hazardous material threat, or an immediate need to be on the lookout for an abducted child, the radio sounds an immediate alarm.

In this part of the country, it's not a question of "if" we'll need access to emergency information, it is a question of "when," particularly when it comes to severe weather. Schools can use NOAA Weather Radio in combination with other information sources to keep informed about developing emergencies. Hearing and understanding critical warnings and other official information is a key component of any safety plan. Schools can monitor NOAA Weather Radio for specific information about their counties and communities, and take appropriate safety measures based on their established plans and procedures.

NOAA Weather Radio broadcasts originate from local National Weather Service Forecast Offices across the United States, and feature 24 hour a day broadcasts of weather information, ranging from basic forecast information, to historical data, to weather facts and trivia. When the weather turns dangerous, the routine broadcasts are replaced with specific information related to the threatening weather at hand, including the very latest county-specific watches, warnings and advisories.

Every school, home and business in Oklahoma and north Texas should have a weather radio.

For more information about NOAA Weather Radios in public schools, visit the website at *http://public-alert-radio.nws.noaa.gov*

Storm Spotter Training. With spring just around the corner, it's time to get ready for what is in an average year, the busiest time of year for severe thunderstorms and tornadoes across Oklahoma and north Texas. Emergency management agencies across the region have scheduled storm spotter training sessions to help get their community's spotters ready to deal with the spring storms to come. Storm spotter training is conducted by a National Weather Service meteorologist, and is usually open to anyone who is interested in learning more about storms and ways to identify dangerous weather. Training is conducted from mid January through the end of March, and we currently have around 45 sessions scheduled in our area of responsibility.

For a complete list of the training sessions, visit our website at *weather.gov/norman/skywarn*.

National Severe Weather Workshop. The National Severe Weather Workshop is scheduled for March 1-3, 2007. Anyone who is interested in learning more about severe weather can attend. The workshop provides a unique opportunity to learn from some of the premier severe weather experts in the world, and to interact and ask questions. Building on last year's success, the workshop will once again feature a chance for you to become an NWS warning forecaster, and emergency manager or a television meteorologist while you deal with a severe weather situation in a scenario developed specifically for this workshop. The workshop will end with free storm spotter training on Saturday afternoon.

For much more information about the National Severe Weather Workshop, visit the website at *www.norman.noaa.gov/nsww2007*.

Cooperative Observer Notes

Thank you!

From the NWS Norman Cooperative Observer Program Team

We know the task of measuring winter precipitation is not an easy one, especially in bone-chilling temperatures and blizzard-like conditions. Thanks to our cooperative observers who took on mother nature and retrieved those reports for us. Your reports are used for not only the article on page 5, but also for climatology and verification. We use your snowfall reports to verify the Winter Storm Warnings and Blizzard Warnings that were issued for this event. Your reports help us to see how we did forecasting the event. They also help us to determine if the same event were to unfold, what would we do differently, if anything.

Your reports are extremely valuable to us. Keep up the hard work! Thanks and good job!

2006 Another Slow Year for Tornadoes

By Rick Smith, Warning Coordination Meteorologist

We all know about the drought that's affected Oklahoma and parts of surrounding states for the past couple of years. But some would say that Oklahoma is also experiencing a tornado drought. For two years in a row, Oklahoma has seen much lower than average numbers of tornadoes. Preliminary statistics for 2006 indicate that 27 tornadoes were reported in the state, which matches the number reported in 2005. Based on data since 1950, the average number of tornadoes in the state is 53.

Of the 27 tornadoes reported to the National Weather Service in 2006, 17 were rated as F0, 8 as F1, and 2 as F3. It's also interesting to note that 2006 marked the third straight year with no violent (F4 or F5) tornadoes reported in Oklahoma. On average we see one violent tornado each year in the state. The two F3 tornadoes occurred in Cherokee and Delaware counties in far northeast Oklahoma on March 12th. The most well-known tornado (the one that received the most local and national news coverage) of 2006 occurred in El Reno on April 24th, as three television helicopters circled and captured spectacular video of an airplane hangar being damaged. The El Reno tornado was rated an F1 on the Fujita scale.

Left: April 24th El Reno tornado as the airplane hangar was hit. Photo © 2006, Gabriel Garfield. Used with permission.

New Observers

The NWS Staff would like to welcome Jeff and Debbie Betts of Caney to the NWS Norman cooperative observer program. We look forward to working with these observers for many years to come.

Observer Retires

The NWS Staff would like to thank Jeanie Coffman of Seymour, TX for her dedicated work. Mrs. Coffman took temperature and precipitation measurements from NWS Norman for six years. Thank you for all of your hard work and best wishes to you!

In Memoriam

We would like to send our condolences to Ms. Ruby Hinds of Cordell. Her husband, H.R. Hinds passed away on Christmas Day at the age of 92. Mr. Hinds had taken precipitation measurements for NWS Norman since 1957. Ms. Hinds has agreed to officially take over the station. We applaud and thank her for her dedication to the cooperative observer program.

Late last year, Mr. Skip Wise of Hennepin passed away. Mr. Wise took temperature and precipitation measurements for the Norman Forecast Office for 13 years. His widow, Ms. Becky Morton has agreed to take over the station. We would like to officially welcome her to the NWS Norman cooperative observer program and express our sincere condolences for the loss of her husband.

Remember to mail the previous month's cooperative observer forms and recording rain gage tapes by the 5th of the month!

The Norman NWS Cooperative Observer Program Team:

Daryl Williams **Forrest Mitchell** **Jennifer Palucki** **Ty Judd** **John Pike**

National Weather Service
Forecast Office
Norman, OK

Phone Number:
405-325-3816

Web Page:
weather.gov/norman

Meteorologist-in-Charge:
Mike Foster

Warning Coordination Meteorologist:
Rick Smith

Science and Operations Officer:
David Andra

Editor:
Jennifer Palucki

In This Issue:

National Weather Service Forecast Office
120 David L. Boren Blvd. Suite 2400
Norman, OK 73072

Check out our text-based and graphical forecasts for your county at *weather.gov/norman*.

Please share this with friends, relatives, and colleagues. Comments and suggestions are always appreciated, by phone at 405-325-3816 or by e-mail at Jennifer.Palucki@noaa.gov.